

**Excelsior Syringe Pump**  
**(140ml Capability)**

**ESP**  
**Operation**  
**Manual**

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## Table of contents

Introduction .....	2
Infusion methods .....	3
Diagram of the ESP.....	4
Instructions for use .....	5
Visual / audible indicators and alarms .....	7
Occlusion correction procedure .....	7
Infusion times and flow rates .....	8
Cleaning .....	9
Periodic functional inspection .....	9
Warnings and cautions .....	10
Limited warranty .....	11
Specifications .....	12
Excelsior product listing .....	13

## Introduction

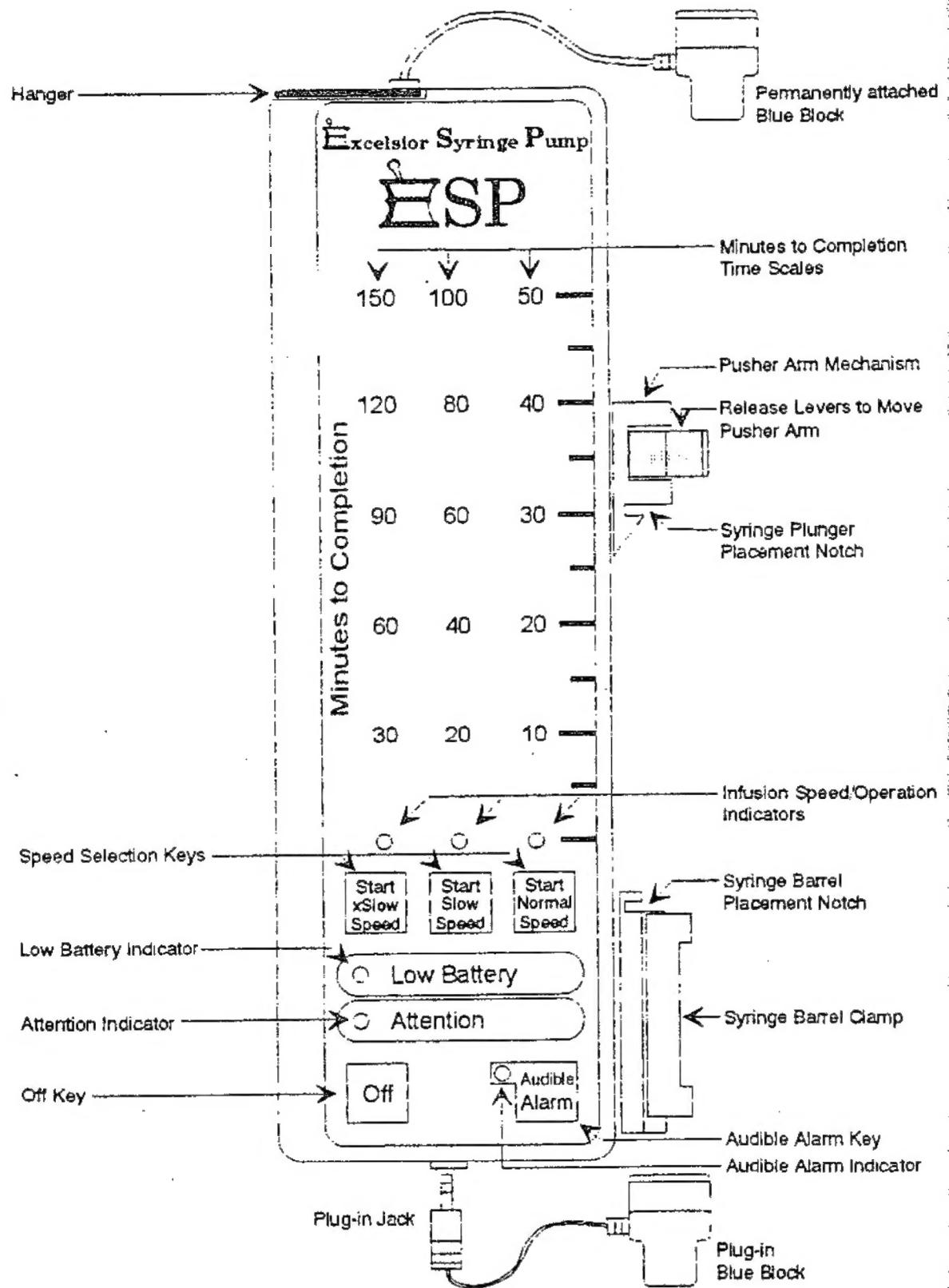
Excelsior is the only company dedicated to the intermittent administration of drugs via syringe pumps. No other company offers a complete system. Excelsior offers the following:

1. Expert analysis of your facility's drug requirements, current method costs and expected cost savings by converting to syringe pumps.
2. State of the art high speed dispensing pump, tubing and adapters. The Pharm-Assist pump was designed by pharmacists specifically for syringe batching.
3. High speed thermal labeler. Nine colors of thermal labels are available for color coding of drugs. The thermal label print will not smear in and out of the freezer. The adhesive is specifically designed for syringe batching use. All standard drug, dose, concentration and volumes are pre-programmed into the system. The user simply enters the lot number, expiration date and quantity of labels.
4. Monoject® bulk packaged syringes (all sizes) and tip caps.
5. Experienced personnel for implementation and training to insure realization of the anticipated cost savings without any hassle or headache.
6. Toll-free telephone numbers: (800) 4 U-Pharm and (888) ESP-Pump for ordering products or any assistance.
7. Highest quality Eveready Energizer® alkaline batteries.

## Infusion methods

1. As a primary intermittent infusion system in combination with a heparin lock.
2. As a piggyback in combination with a primary IV delivering compatible maintenance fluids or drug diluents, the primary line flow rate need not be interrupted. The microbore extension set is attached to the primary line at the lower injection port or flashball site.
3. As a piggyback in combination with an IV controller or IV pump. No change to the pump or controller is required. The microbore extension set is attached to the primary line at an injection port or flashball site downstream from the primary infusion device.
4. As a piggyback in combination with a volume control chamber (burette). The flow rate for the burette is not interrupted. The microbore extension set is attached to the primary line at either the lower injection port or the flashball site.

## Diagram of the ESP



## Instructions for use

CDC Guidelines, Institutional Policies and accepted IV therapy principles should be followed.

1. Load batteries. Open the battery compartment by turning the battery screw cap on the bottom of the device. Insert four "C" cell alkaline batteries into the unit with the negative (-) side or flat side of the battery going in first toward the top of the device. *Use only alkaline batteries.*
2. Verify the drug, concentration and dose in the filled syringe are correct for the patient.
3. Using standard aseptic technique and following all guidelines of the hospital, attach the microbore extension set to the filled syringe. Prime the syringe and microbore extension set. *Expel all air making sure to eliminate all air bubbles.*
4. Move the pusher arm mechanism to the top of the device by squeezing the two black levers of the pusher arm together and sliding the pusher arm upward.
5. Place the filled syringe into the syringe barrel clamp holder. *The syringe barrel flange must be fully inserted in the molded slot of the syringe barrel clamp holder.*
6. Move the pusher arm mechanism down until it touches the syringe plunger. *The syringe plunger should be flush against the pusher arm mechanism.*
7. Using standard aseptic technique, attach the distal end of the primed microbore extension set to the infusion site. When attached to a primary set, the closest injection site to the patient is recommended.
8. If using the 140ml syringe, insert the blue block into the pusher arm between the two black release levers. The blue block is either permanently attached to the top of the unit or plugged into the bottom of the unit.

**CAUTION:** DO NOT force the blue block into the pusher arm, if the blue block does not easily fit into the pusher arm, squeeze and release the black release levers so that the levers are fully expanded.

- a) The blue block must be inserted prior to pressing a start key.
- b) Permanently attached to top of unit - If the blue block is removed during the infusion, the ESP will stop, the attention light will flash and the audible alarm will sound.
- c) Plug-in to bottom of unit - The 140 mode is de-activated only by removing the plug-in jack from the bottom of the unit.

**CAUTION:** For the unit with the blue block permanently attached to top of unit, insert the blue block only with the 140ml syringe. Insertion with smaller size syringes will result in significantly higher occlusion detection pressures than those listed in the user manual. Use only 140ml syringes with the 140ml syringe mode. Do not enter the 140ml syringe mode for smaller size syringes.

**CAUTION:** For the unit with the blue block that plugs-in to bottom of unit - Do Not Plug the 140ml connector into the bottom of the ESP unless using a 140ml syringe. Use with smaller size syringes will result in significantly higher occlusion detection pressures than those listed in the user manual. Use only 140ml syringes with the 140ml syringe mode. Do not enter the 140ml syringe mode for smaller size syringes.

9. Check the time scales and speed settings and start the infusion by pressing the desired *START/SPEED* key. One beep confirms the key press and the green light above the selected speed key will flash during infusion.

- a) If the 140ml syringe blue block was inserted in the pusher arm, three beeps after the key press confirm that the 140ml syringe mode with higher occlusion detection pressure during infusion was selected.
- b) The green light above the selected *Start/Speed* key will double flash in 140ml syringe mode.
- c) If the blue block is removed during the infusion (attached cord) or the plug-in adaptor is removed, the ESP will stop, the attention light will flash and the audible alarm will sound.

10. The audible alarm will automatically be activated (indicated by the green flashing LED on the alarm key) and will sound at the end of infusion or occlusion. Press the *ALARM* key to disable the audible alarm. The green LED will be off if the audible alarm is disabled. *The visual end of Infusion Attention alarm (red flashing LED) cannot be deactivated.*

11. Red flashing LED will indicate the end of infusion. If the audible alarm was not disabled, a periodic beep tone will sound. Press the *OFF* key to turn off the alarms and power to the device.

12. To stop the infusion at any time, press the *OFF* key.

13. The device may be mounted to an IV pole with the pole clamp or hung on an IV pole hook by using the stainless steel hanger on the top of the unit. The pole clamp is firmly attached to the unit by a set screw on the side of the aluminum pole clamp.

## Visual /audible indicators and alarms

1. Flashing green LED above one of the three *START/SPEED* keys indicates the pump is operating at that selected speed. Double Flashing green light above a Start/Speed key indicates 140ml syringe mode at that speed setting. To change the selected speed of operation,
  - a) press the *OFF* key to stop infusion
  - b) press the desired *START/SPEED* key to begin infusion
2. Flashing green LED on the *Audible Alarm* key indicates that the audible alarm is activated and will sound a periodic beep tone at the end of infusion or occlusion. To disable the audible alarm, press the *Audible Alarm* key. The flashing green LED on the *Audible Alarm* key will be off.
3. Flashing red LED (next to "Attention" on the keypad) indicates an end of infusion or occlusion. If the syringe plunger is at the bottom of the syringe, the alarm indicates the end of infusion. Otherwise, the alarm indicates an occlusion. It also flashes when the low battery light is activated at start-up and when the blue block or plug-in adaptor is removed during 140ml mode.
4. Flashing orange LED (next to "Low Battery") indicates the batteries have low power. If the low battery light appears during an infusion, the infusion may safely be continued to completion. Prior to starting a new infusion, replace all four batteries with new "C" cell alkaline batteries. The ESP will not start a new infusion if the low battery LED light is flashing.
5. All Speed lights and Attention light flashing indicate unit accuracy has exceeded +/- 3% error. Check to see if the pusher arm was restricted from movement. Correct the obstruction and continue the infusion or contact biomedical engineering if the alarm continues.

## Occlusion correction procedure

- 1) Press the *OFF* key to turn off the audible alarm and flashing red LED.
- 2) Relieve the pressure by moving the Pusher arm toward the top of the unit away from the syringe plunger and/or disconnect the microbore extension set at the infusion site to prevent an accidental bolus.
- 3) After clearing the occlusion, move the pusher arm mechanism down until it touches the syringe plunger. *The syringe plunger should be flush against the pusher arm mechanism.*
- 4) Using standard aseptic technique and following all guidelines of the hospital, attach the distal end of the primed microbore extension set to the infusion site.
- 5) Start the infusion by pressing the desired *START/SPEED* key. The audible alarm will automatically be activated.

## Infusion times and flow rates

(Monoject® Syringes - nominal values)

Volume /Syringe Size	X-S	Infusion Times (in minutes)		Flow Rates (ml/hr)		Nominal Occlusion	
		Slow	Normal	X-S	Slow	Normal	
5ml / 6ml	51	34	17	5.9	8.8	17.7	41
10ml / 12ml	66	44	22	9.2	13.7	27.4	26
20ml / 20ml	80	53	27	15.1	22.6	45.2	16
30ml / 35ml	87	58	29	20.7	31.0	62.0	12
50ml / 60ml	116	78	39	25.8	38.6	77.2	9.3
100ml /140ml	114*	76*	--	52.8*	79.0*	--	12*

\* The 140ml syringe can only be used with the special attached or plug-in adaptor and by inserting the blue block attachment into the pusher arm mechanism. DO NOT USE the special attached or plug-in adaptor blue block when infusing syringes of smaller size than the 140ml syringe - use will result in significantly higher occlusion detection pressures than those stated in this manual. DO NOT enter the 140ml syringe mode for smaller size syringes. Do not use the 140ml mode on Normal Speed.

## Infusion times and flow rates

(Becton Dickinson Syringes - nominal values)

Volume/Syringe Size	X-S	Infusion Times (in minutes)		Flow Rates (ml/hr)		Nominal Occlusion	
		Slow	Normal	X-S	Slow	Normal	
5ml / 5ml	57	38	19	5.2	7.8	15.7	45
10ml / 10ml	78	52	26	7.6	11.4	22.7	31
20ml / 20ml	90	60	30	13.3	19.8	39.7	18
30ml / 30ml	105	70	35	17.1	25.6	51.1	14
50ml / 60ml	116	77	39	25.9	38.8	77.5	9.2

## Cleaning

Clean the exterior surfaces of the unit with a damp cloth and mild detergent or isopropyl alcohol. Avoid getting liquids inside the device. CAUTION: Use of silicone based solvents or harsh cleaning agents will cause damage to the plastic case and components.

## Periodic functional inspection

A periodic functional check should be performed at least every six months. The inspection should include a functional test to confirm the unit is fully operational. Example guidelines are as follows.

1. Syringe barrel clamp holder should adequately hold each size of syringe (5/6, 10/12, 20, 30/35, 60 and 140) firmly in place.
2. The pusher arm mechanism should release by pressing the two black release levers and move easily up and down the unit.
3. The pusher arm mechanism should engage after releasing the two black release levers.
4. Press the *START NORMAL SPEED* key. The green LED directly above that key should be flashing and motor operation should be slightly audible.
5. Place the pusher arm mechanism completely at the bottom of travel next to the syringe barrel clamp holder. The operation should continue until the end of infusion alarm. Both the flashing red LED and the periodic beep tone should be operative. Use a filled syringe to simulate infusion or a syringe with the plunger completely pressed to the bottom of the barrel to simulate an end of infusion. If checking occlusion pressures, do not use a syringe for more than one test.
6. Press the *ALARM* key. The audible periodic beep tone should cease, but the flashing red LED should continue.
7. Press the *OFF* key and then the *START NORMAL SPEED* key. The unit should not restart, but continue to indicate both visual and audible end of syringe alarms.
8. Release the pusher arm mechanism and repeat steps 4 and 5 for X-Slow and Slow speeds.
9. Pusher arm mechanism and syringe barrel clamp should move freely on the two rails. Use petroleum jelly to lightly lubricate the two rails and lead screw. *DO NOT USE SILICONE LUBRICANTS - DAMAGE TO PLASTIC MAY OCCUR*
10. Repeat step 8 using X-Slow and Slow speeds with the pump in 140ml mode.

## Warnings and cautions

- Avoid any liquids inside the pump. The unit is not waterproof or water resistant.
- If a large amount of fluid is spilled on or in the unit, send to the hospital biomedical department prior to performing an infusion.
- Do not sterilize the pump.
- Do not use the pump with narcotics, anesthesia, chemotherapy, radioactive pharmaceuticals, fat emulsions or blood products.
- This unit is intended for use under hospital supervision only. Home patient use is allowed only with instructions provided to the home patient.
- Use only with supervision and direction from a licensed pharmacist, nurse or physician.
- Do not reuse disposable syringes or microbore extension sets. Both are for Single Use Only. Follow CDC and or institutional guidelines. Use only tubing with Excelsior specifications.
- Battery life will be affected by alarm durations and backpressure.
- Use the blue block only with the 140ml syringe. Use with smaller size syringes will result in significantly higher occlusion detection pressures than those listed in the user manual. Use only 140ml syringes with the 140ml syringe mode. Do not enter the 140ml syringe mode for smaller size syringes.
- Do Not Plug the 140ml connector into the bottom of the ESP unless using a 140ml syringe. Use with smaller size syringes will result in significantly higher occlusion detection pressures than those listed in the user manual. Use only 140ml syringes with the 140ml syringe mode. Do not enter the 140ml syringe mode for smaller size syringes.

## Limited warranty

**Product Standards:** Excelsior products are certified to comply with written Excelsior specifications at the time of shipment.

**Product Warranty:** The Excelsior Syringe Pumps are warranted against defects in material and workmanship for a period of six months from the date of delivery. Excelsior will repair or replace, at its option, any product that proves to be defective during the warranty period, provided proper use and maintenance procedures have been followed as described in the operation manual. If upon examination, Excelsior determines that misuse of product is the cause for the repair, all labor, material and shipping costs involved shall be paid by the Buyer.

All defective products or components shall be returned to Excelsior with a detailed explanation of the failure. Buyer shall obtain a return authorization prior to return of product and all transportation charges must be prepaid.

**Limitations:** THE PROVISIONS ABOVE CONSTITUTE EXCELSIOR'S SOLE OBLIGATION AND EXCLUDE ALL OTHER REMEDIES OR WARRANTIES EXPRESS, STATUTORY OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, whether or not purposes or specifications are described herein. Excelsior further disclaims any responsibility whatsoever to Buyer or to any other person for injury to person or damage to or loss of property or value caused by any product that been subjected to misuse; negligence or accident; or misapplied or used in violation of product manuals, instructions or warnings; or modified or repaired by unauthorized persons; or improperly installed.

UNDER NO CIRCUMSTANCES SHALL EXCELSIOR BE LIABLE FOR ANY INCIDENTAL, INDIRECT, CONSEQUENTIAL OR SPECIAL DAMAGES, LOSSES OR EXPENSES (even if Excelsior had been advised of the possibility of such damages) arising from the use of, inability to use or repair of Excelsior's product for any purpose whatsoever. BUYER AGREES THAT ANY RECOVERY AGAINST EXCELSIOR SHALL NOT BE GREATER THAN THE PURCHASE PRICE PAID FOR THE PRODUCT AS TO WHICH SUCH CLAIM IS MADE. EXCELSIOR'S SELECTION TO ONE OF ITS ALTERNATIVES (REPLACE OR REPAIR) SHALL BE BUYER'S EXCLUSIVE AND SOLE REMEDY. No person is authorized to modify or amend the written warranty, product claims and specifications or to bind the corporation to any term contrary to the terms herein.

Service performed by other than Excelsior or its authorized agents may, at the discretion of Excelsior, be cause to void this warranty. Excelsior's tubing sets are the only tubing products that may be used with the ESP and Pharm-Assist pumps. If other sets are used, it may, at the discretion of Excelsior, be cause to void this warranty.

## Specifications

<b>Accuracy (Travel)</b>	+/- 3%
<b>Battery Life</b>	400 hours typical
<b>Low Battery Level</b>	If low battery LED is flashing - replace all four batteries with new alkaline "C" cells
<b>Batteries</b>	Four "C" size alkaline cells
<b>Syringes Recommended</b>	Monoject single use 6ml - 140ml, BD or Terumo (3ml for saline flushes)
<b>Rate of Travel</b>	
Normal	5.48 +/- 3% inches per hour
Slow	2.74 +/- 3% inches per hour
XSlow	1.83 +/- 3% inches per hour
<b>Occlusion Force</b>	7.75 +/- 1.25 pounds (refer to chart for syringe psi; syringe psi is determined by occlusion force and syringe diameter)
<b>140ml Syringe Mode</b>	140ml syringe occlusion detection at 10 psi +/- 5 psi. CAUTION: Do not use the 140ml syringe mode on smaller size syringes - Detection of occlusion will occur at significantly higher pressures.
<b>Overall size</b>	9.2" x 1.7" x 4.7" (approximate)
<b>Weight</b>	1.2 lbs not including batteries



## Call (800) 4U-Pharm

### Pumps and Accessories

Variable speed syringe pump	ESP	each
Pharm-Assist dispensing pump	Pharm-Assist	each
Pump stand (use pump outside hood)	PS01	each
Filling stand (holds tubing during batching)	SH01	each
Ohaus 2kg or 5kg electronic scale	SC01/CT01	each
Eveready Energizer® alkaline "C" cell batteries	Batteries	72/box

### Disposable Tubing Sets and Adapters

Microbore 60" extension sets	M60	100/box
Microbore w/ 0.22 filter 60" sets	FM60	100/box
Microbore w/ set change label	LM60	100/box
Microbore 72" extension sets	M72	100/box
Single lead tubing sets (Pharm-Assist)	PA01	30/case
Dual lead tubing sets (Pharm-Assist)	PA02	25/case
Triple lead tubing sets (Pharm-Assist)	PA03	25/case
Syringe filling adapter (luer/taper)	SA250	250/case
Oral liquid tubing set (glass tip included)	ORAL	8/case
Glass tip for oral liquid tubing set	GT01	each

### Labeling System and Supplies

Excelsior thermal label printer (with drug label software)	PRINT	each
Hand-held thermal label applicator	TPC	each
Thermal labels (1000/roll) (yellow, blue, green, red, violet, white, rose)	PAB - X	16 rolls/case

### Monoject Syringes & Tip Caps (Packaged in Trays)

3CC Syringes - 25/tray	3CC	200/case
6CC Syringes - 25/tray	6CC	200/case
12CC Syringes - 25/tray	12CC	200/case
20CC Syringes - 25/tray	20CC	200/case
35CC Syringes - 10/tray	35CC	120/case
60CC Syringes - 10/tray	60CC	120/case
140CC Syringes - 20/box	140CC	20/box
Tip caps for syringes - 10/tray	T10	1,000/case
Tip caps for syringes - 25/tray	T25	1,000/case